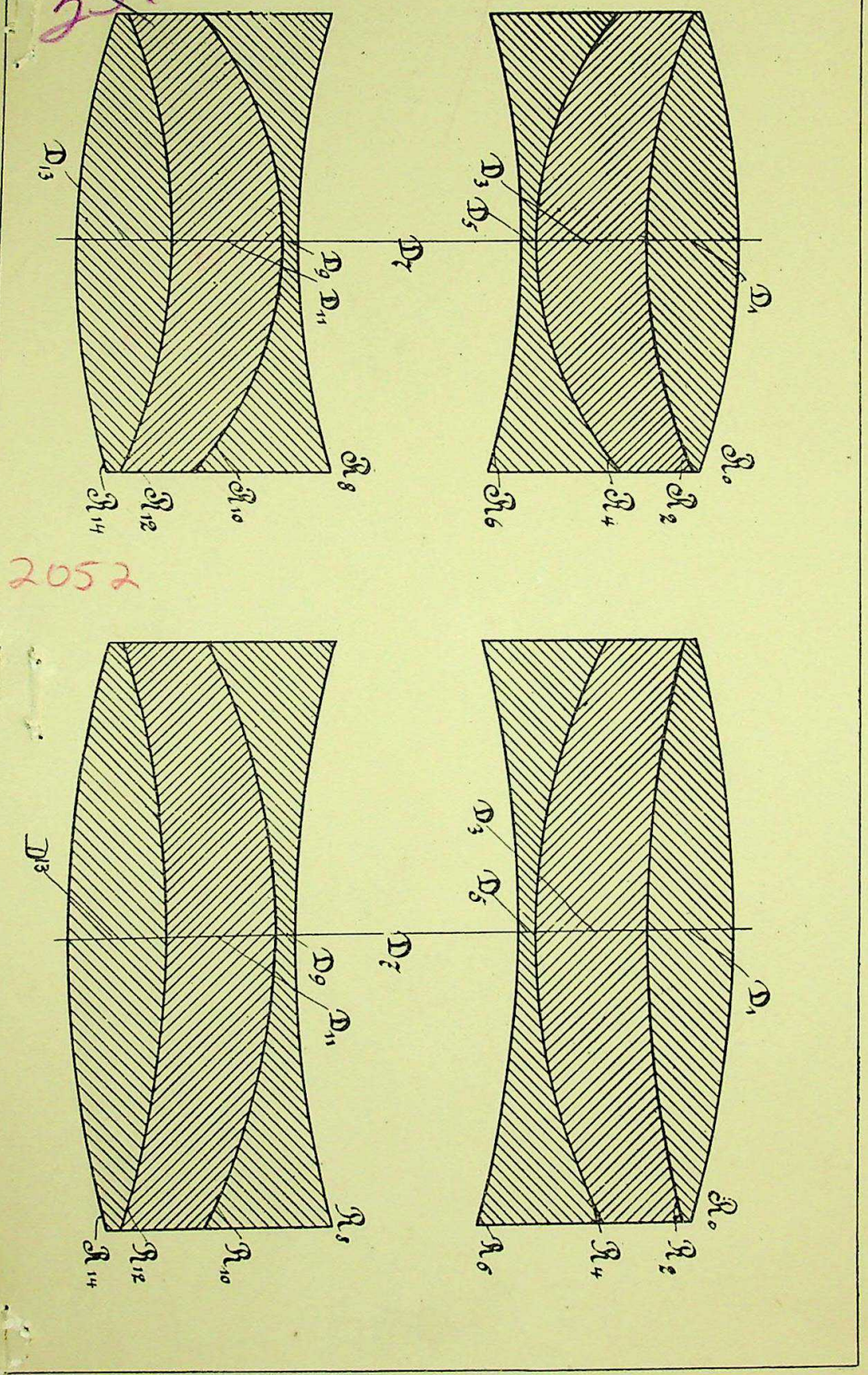
A.D. 1895. JULY 4. N° 12,949.
STEINHEIL'S COMPLETE SPECIFICATION.

British

(1 SHEET)



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[This Drawing is a reproduction of the Original on a reduced scale.]

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Malby & Sons, Photo-Litho.

N° 12,949 A.D. 1895

Date of Application, 4th July, 1895

Complete Specification Left, 1st Apr., 1896—Accepted, 27th June, 1896

PROVISIONAL SPECIFICATION.

Improvements in Lenses for Photographic Purposes.

I, RUDOLF STEINHEIL of 7, Theresienhöhe, München, Bavaria, Manufacturer do hereby declare the nature of this invention to be as follows :—

The discovery of new sorts of glass has rendered it possible to produce two kinds of lenses which consist of two positive, equal or similar parts, each of which is in itself chromatically, spherically, and astigmatically corrected, consequently the finished lens contains these three corrections, whereas formerly lenses of two positive, equal or similar parts, could only be corrected chromatically and spherically, as in attempting to effect the astigmatic correction an unsymmetrical construction resulted. Astigmatic corrections can only be made on a divisional surface of two mediums which presents the concave side to the more highly refractive medium, whilst the spherical correction can only be made on a divisional surface which presents the concave side to the not so highly refractive medium.

Having this principle as a basis lenses can be constructed out of symmetrical or similar halves which on the first divisional surface of the separate halves are corrected astigmatically and on the second surface are corrected spherically.

Lenses so constructed have this characteristic, that a positive lens is enclosed by a double convex one, and by a double concave one, both of which have a higher refractive power than the enclosed positive lens.

The lens shown on the accompanying sheet of drawings consists of symmetrical or similar halves, differing only in proportion, each of which is composed of three cemented lenses. The middle lens is a positive one and is enclosed by a double convex lens and by a double concave lens, both of the two latter possessing stronger refraction than the enclosed positive lens.

Taking a focal distance of 493 mm., a lens constructed on the principle of this invention with a degree of exposure of 1 : 6, would have the following elements :

R 0 = R 14 + 173,00 mm. R 2 = R 12 ± 139,66 „	D 1 = D 13 = 20 mm.	nD = 1,61003 nF = 16,1759
R 4 = R 10 ± 77,805	D 3 = D 11 = 25 „	nD = 1,51874 nF = 1,52561
R 6 = R 8 − 202,470	D 5 = D 9 = 4 „	nD = 1,56370 nF = 1,57160

Difference D 7 = 50

R = Radii D = Thickness

[*Price 8d.*]

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whilst with a focal distance of 476 mm. with an exposure proportion 1 : 4 the elements of a lens constructed from the foregoing point of view are the following :

$$x\,0 = 59{,}5$$

$$\left.\begin{aligned} R\,0 = R\,14 &= +\ 229 \\ R\,2 = R\,12 &= \pm\ 562{,}95 \end{aligned}\right\} \begin{aligned} n\,D &= 1{,}62356 \\ n\,F &= 1{,}63498 \end{aligned}$$

$$R\,4 = R\,10 = \pm\ 142{,}03 \left\{\begin{aligned} n\,D &= 1{,}50786 \\ n\,F &= 1{,}51351 \end{aligned}\right.$$

$$R\,6 = R\,8 = -\ 490{,}196 \left\{\begin{aligned} n\,D &= 1{,}60304 \\ n\,F &= 1{,}61428 \end{aligned}\right.$$

$D\,1 = D\,13 = 20$; $D\,3 = D\,11 = 25$; $D\,5 = D\,9 = 4$; Difference $D\,7 = 50$.

Dated this 3rd day of July 1895.

W. P. THOMPSON & Co.,
Agents for the Applicant.

COMPLETE SPECIFICATION.

Improvements in Lenses for Photographic Purposes.

I, RUDOLF STEINHEIL of 7 Theresienhöhe, Munich in the Kingdom of Bavaria, Manufacturer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

The discovery of new sorts of glass has rendered it possible to produce two kinds of lenses which consist of two positive, equal or similar parts, each of which is in itself chromatically, spherically and astigmatically corrected, consequently the finished lens contains these three corrections, whereas formerly lenses of two positive, equal or similar parts, could only be corrected chromatically and spherically, as in attempting to effect the astigmatic correction an unsymmetrical construction resulted. Astigmatic corrections can only be made on a divisional surface of two mediums which presents the concave side to the greater refractive medium, whilst the spherical correction can only be made on a divisional surface which presents the concave side to the lesser refractive medium.

With this principle as a basis, lenses can be constructed out of symmetrical or similar halves which on the first divisional surface of the separate halves are corrected astigmatically and on the second surface are corrected spherically. Lenses so constructed have this characteristic, that a positive lens is enclosed by a double convex one, and by a double concave one, both of which have a higher refractive power than the enclosed positive lens.

The lens shown on the accompanying sheet of drawings consists of symmetrical or similar halves differing only in proportion, each of which is composed of three cemented lenses. The middle lens is a positive one and is enclosed by a double convex lens and by a double concave lens, each of the two latter possessing stronger refractive power than the enclosed positive lens.

Taking a focal distance of 492 mm., a lens constructed on the principle of this invention with a degree of exposure of 1 : 6 would have the following elements :—

$x\,0 = 41.$

$R\,0 = R\,14 = +\ 173{,}00$ mm.
$R\,2 = R\,12 = \pm\ 139{,}66$ „ } $D\,1 = D\,13 = 20$ mm. { $n\,D = 1{,}61003$, $n\,F = 1{,}61759$

$R\,4 = R\,10 = \pm\ 77{,}805$ „ $D\,3 = D\,11 = 25$ „ { $n\,D = 1{,}51874$, $n\,F = 1{,}52561$

$R\,6 = R\,8 = -\ 202{,}47$ „ $D\,5 = D\,9 = 4$ „ { $n\,D = 1{,}56370$, $n\,F = 1{,}57160$

Difference $D\,7 = 50$

$n\,D$ and $n\,F$ = the indices of refraction for the Frauenhofer lines D F

R = Radii D = Thickness

$x\,0$ = Radius of lens aperture

whilst with a focal distance of 476 mm. with an exposure proportion of 1 : 4, the elements of a lens constructed from the foregoing point of view are the following :—

$x\,0 = 59{,}5$

$R\,0 = R\,14 = +\ 229$
$R\,2 = R\,12 = \pm\ 562{,}95$ } { $n\,D = 1{,}62356$, $n\,F = 1{,}63498$

$R\,4 = R\,10 = \pm\ 142{,}03$ { $n\,D = 1{,}50786$, $n\,F = 1{,}51351$

$R\,6 = R\,8 = -\ 490{,}196$ { $n\,D = 1{,}60304$, $n\,F = 1{,}61428$

$D\,1 = D\,13 = 20$; $D\,3 = D\,11 = 25$; $D\,5 = D\,9 = 4$; Difference $D\,7 = 50$.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is :—

A lens consisting of symmetrical or similar halves differing only in proportion, each of which is composed of three cemented lenses, namely, a positive lens, a double convex lens and a double concave lens, the two latter enclosing the former and both of said double convex and double concave lenses possessing stronger refractive powers than the enclosed positive lens, substantially as hereinbefore described.

Dated this 31st day of March 1896.

WM. P. THOMPSON & Co.,
Of 6, Lord Street, Liverpool, Agents for the Applicant.

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